Space Weather Forecast

Issued on Monday, 07 August 2023 at 01:28 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Minor/Moderate storm likely from CME arrivals Days 1-2 (07-8 Aug). R1-R2 Radio blackouts with slight likely with slight chance R3 Day 1 (07 Aug).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with a single Moderate flare observed from the complex region near the western limb that was the source of the Strong flare on 05 Aug. This region is no longer possible to analyse, and will rotate onto the far-side shortly after the issue of this forecast. Despite this, further activity will likely be observable from this region through day 1 (07 Aug) with its magnetic canopy still visible in SDO imagery. There are two other regions of note, amongst the ten total sunspot regions. The first is also in the northwest, but is a small region that has an unusual orientation of its opposite polarity spots that can indicate an increased potential for flaring. The other in the southeast and is dominated by a large mature spot, but has seen some small spot development around its periphery.

No Earth-directed CMEs (coronal mass ejections) were observed in the last 24 hours, with the CME from the Moderate flare a clear miss, passing ahead of Earth.

Solar Wind / Geomagnetic Activity: Solar winds showed the exit from the previous CME enhancement on 05 Aug, and into background conditions. Its speed persisted at ambient levels, around 350 km/s. Density was below average. The total interplanetary magnetic field strength was Weak to Moderate. The north-south component was initially weak and towards the north (positive), but with a relatively smooth profile until 06/1410 UTC due to the ongoing CME cloud. A marked change to more turbulent but weak conditions then occurred as Earth exited these conditions. Geomagnetic activity was Quiet (Kp0-1).

Energetic Particles / Solar Radiation: The observed count rate of energetic particles (high energy protons) was initially at S1/Minor Storm levels due to the observed flares on 05 Aug, before easing back below the S1 threshold 06/0535 UTC. The count rate remained slightly above background however.

Four-Day Space Weather Forecast Summary

Solar Activity: Further Moderate flares are likely day 1 (07 Aug) mainly from the sunspot that produced the recent Strong flare, from just over the northwest limb. There is a slight chance of a further isolated strong flare. This risk decreases day 2 (08 Aug) onward with activity becoming mainly Low but with a chance of rising to Moderate.

Solar Wind / Geomagnetic Activity: There are a number of potential CME arrivals day 1-2 (07-08 Aug), primarily from the flaring of AR3386 on the 04-05 Aug. These are most likely to give a series of glancing impacts, however confidence remains low and they could yet miss, or could combine or arrive concurrently to give a more significant enhancement. Quiet geomagnetic activity at first has the potential to become Active to G1 Minor Storm, with G2 Moderate storm intervals, with any CME arrivals. There is a slight chance of G3 Strong storms, mainly early on 08 Aug. Any enhancement is expected to ease day 3 (09 Aug) onward.

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Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to continue declining day 1 and 2 (07 and 08 Aug) but with a chance of rising again with any flares that occur from the region that was the source of the previous enhancement. This gives a slight chance of further S1 Minor Radiation Storms, mainly day 1 or 2.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	60	70	30	1
Strong	G3	No	10	15	1	1
Severe	G4	No	1	2	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	40	40	40
Very Active	R3 to R5 X	No	15	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	20	15	5	5
Very Active	≥ S3 *	No	2	2	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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